HILL FIELD, ENGINE TEST #1
(HILL FIELD, BUILDING 267)
(HILL FIELD, BUILDING 113)
5820 Engine Lane
Layton Vicinity
Davis County
Utah

HAER No. UT-85-S

HAER
UTAH
6-LAY.V,
25-

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
Rocky Mountain System Support Office
National Park Service
P.O. Box 25287
Denver, Colorado 80225-0287

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Location: 5820 Engine Lane, Hill Air Force Base, Layton Vicinity, Davis County, Utah

UTM: 12-418460-4551460

Date of Construction: 1942

Architect: U.S. Army Corps of Engineers

Builder: Mead & Mount Construction Company

Present Owner: Hill Air Force Base

Present Use: Engine Test Cells

Significance: Aircraft engines were completely overhauled at Ogden Air Depot (now Hill Air Force Base), and then tested for safety and effectiveness in the Engine Test Cells, Buildings 267 and 268. These two buildings provide particularly vivid images of the processes involved in the repair and maintenance of aircraft, a crucial component of Hill Field's overall mission to support Pacific and European theaters of military operation during World War II. In addition, they contribute to a deeper understanding of the early development of the U.S. Army Air Corps, a branch of the Army which eventually became the U.S. Air Force. Hill Field was one of only two air depots established in the United States during the tumultuous years immediately preceding World War II.

History: Aircraft engines were removed from planes in the Aircraft Repair Hangars (Building 225) and brought to the Engine Repair Building (Building 265) for disassembly and complete overhaul. Completed engines were transferred to the Engine Test Cells (Buildings 267 and 268) for diagnostic testing before they were reinstalled on planes in the Aircraft Repair Hangars.

The Engine Test Branch was activated in January 1942, with Mr. Arthur R. Smith as acting foreman. Four cells were available in the Engine Test Building but none were ready for use because the necessary equipment had not yet been installed. Much difficulty was encountered in obtaining needed materials; the first engine (a Pratt & Whittney R-2800-5) was not tested until three months later. By August 1942, twelve test cells were in use, and approximately 50 engines were processed that month. Production increased rapidly, though; within five months, 150 engines were completed and tested each month. Completed and tested aircraft engines were either taken directly to the Aircraft Repair Hangars (Building 225) and installed on waiting aircraft or prepared for storage and then transferred to Building 273, the Engine Storage Warehouse.

In order to be tested, engines were mounted to the ceiling and floor of each test cell through the use of built-in anchors and then activated at full power. Monitoring devices were attached to the engines, and technicians observed the progress of the engines in adjacent control rooms that featured gauges. Small windows on the interior walls of the testing cells allowed workers to view the testing operations without being in the same room with the engine.

Quotas set by Air Command for aircraft engines and other parts were rarely met in the beginning months of World War II. Materials were often difficult to obtain and the majority of special tools were unobtainable and had to be designed and manufactured on the Base. As the war progressed, the obstacles of the first months of War production began to subside. A shortage of special parts, tools, equipment, and adequate working space continued to present challenges, but in gradually reduced proportion. Many items continued to be manufactured by the depot shops as the needs for them became sufficiently urgent.

Parts shortages again surged during the Korean Conflict of the early 1950s. In order to expedite the completion of projects, parts were frequently removed from the last planes in a repair line, repaired, and then reinstalled on planes that were ahead of the original planes. This enabled each early phase of production to proceed without delay, but often resulted in a crisis when the last plane was ready to receive unavailable parts. Sometimes, the parts arrived from other installations in time to complete the last planes in a line without delay, but often, the parts were unavailable from other sources and were manufactured locally.

In efforts to increase efficient production methods, all aircraft repair activity was carefully monitored and controlled by the Production Control Branch. The status of aircraft engines and other parts could be accurately determined at any of the various stages of production. The Branch obtained and decimated technical information to workers and handled technical correspondence, including all official long distance telephone calls pertaining to the engineering department. As the Production Control Branch gathered statistics, employees and materials could be more efficiently allocated among the departments.

Coordination between departments came gradually as the units began to understand their relationship to each other and as specialized labor and production line methods became widespread. Even with careful planning, though, operations progressed at different rates in each department. Frequent rush orders or parts shortages caused congestion in the production lines that disrupted interdepartmental flow.

One of the recurring engine problems in the early 1950s was the excessive rejection of engines on the test block due to high oil consumption. Investigation disclosed that the finish on the cylinder wall of the engine was too smooth, caused primarily through the use of substitute honing stones of inferior quality. Rejected engines were routed back through the assembly lines, and cylinder walls were re-honed with a new type of stone that increased surface roughness by 50%. Upon reevaluation in the Engine Test Cells, the oil consumption of these engines was found to be within Technical Order tolerances.

Minor adjustments to the Engine Test Cells include the addition of an overhead monorail system with spray booths in 1943, and the installation of guard rails in 1949. An overhead engine conveyor to take the engines from the test blocks to the Engine Storage Warehouse #16 (currently Building 273) was considered in 1944. Operations Inspectors believed it would eliminate many of the hazards previously encountered in the manual transportation of newly overhauled and tested engines. The conveyor was never installed, though, according to Base real estate records.

In 1945, Minneapolis-Honeywell Automatic controls were ordered for each of the Engine Test Cells after supervisory personnel made several visits to other depots who were using them. These devices provided semi-automatic or automatic controls on the gasoline and oil lines, which significantly improved fuel efficiency and dramatically increased fire safety during the testing process. Test Cell #5 was the first to receive the new equipment, which required 1,350 man-hours to install. The other test cells followed suit; within three months, half of the test cells featured the automatic controls.

On June 11, 1951, a gasoline explosion occurred in Building 267 while seven workers from the Maintenance Services Section were installing electronic equipment in the cells. When one of the workers applied stress to a 3/4 inch rubber gasoline tube, a thread-weakened joint ruptured above the shutoff valves, spewing a stream of 100 octane gasoline into the control room of the test cells. The gasoline ignited and an explosion, followed by fire, resulted. The exact source of ignition was not determined due to numerous possibilities, such as generators, water heaters, and other electrical equipment.

Although the fire department responded immediately and the fire was extinguished within a few minutes, losses were extensive. One worker was killed; six others who were inside the building were seriously injured. Seven firefighters were hospitalized for smoke inhalation and exhaustion, and six others received treatment at the scene. Remarkably, the building suffered no major structural damage, a testament to its ability to withstand excessive forces. Most damage occurred to utilities inside the building. The adjacent Engine Repair Building (Building 265) required replacement of window sashes and frames, and a covered walkway, used to transport engines from the Engine Repair Building to the test blocks, was completely destroyed. Damage was estimated at $100,000.

Buildings 267 and 268 have individual notations, but they basically function as one building. Each building contains four engine test cells in separate rooms, work areas, and offices. The two buildings are connected by a one-story administration building, boiler room, and covered passage. The thick concrete walls and absence of windows were designed to withstand considerable forces, while containing engine noise. The design of the building facilitated a sterile, private working environment.

Ventilation and noise control were important considerations in the design of these buildings. An extensive series of blowers and ceiling exhaust vents pervades the entire building. Massive concrete intake stacks with small cooling towers are present over each testing cell. Interior doors, walls, and ceilings are insulated with 2" soundproofing insulation.

Building 267, the smaller of the two buildings, contains a full basement that contained two long, narrow, parallel rooms that are connected by a single narrow tunnel. Skylights over vertical tunnels provided natural light down through the building to these rooms, which contained a machine room and distribution room.

General Description: Building 267 is a 1.5 story reinforced concrete structure with a full basement and flat roof. Together with Building 268, it forms a very large, irregular u-shape. The exterior is characterized by a stunning lack of distinguishing decorative elements. No windows are present. Heavy duty explosion-proof doors line the exterior of the original portion of the test facility.

The two engine test stand structures, Buildings 267 and 268, are connected by a one-story administration building, boiler room, and covered walkway. The metal fire escape and rungs are believed to be original, based upon visual inspections and comparison to the original construction drawings. The original glass block in the portico was removed after 1957.